### (12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

### (19) World Intellectual Property Organization

International Bureau



## 

(43) International Publication Date 20 January 2005 (20.01.2005)

**PCT** 

# (10) International Publication Number WO 2005/006255 A1

(51) International Patent Classification7: G06T 7/60, 7/00

(21) International Application Number:

PCT/IB2003/002703

(22) International Filing Date: 9 July 2003 (09.07.2003)

(25) Filing Language:

English

(26) Publication Language:

English

(71) Applicants (for all designated States except US): HU-MANITAS MIRASOLE S.p.A. [IT/IT]; Via Manzoni, 56, I-20089 Rozzano, Milano (IT). FONDAZIONE "MICHELE RODRIGUEZ" - ISTITUTO SCIENTIFICO PER LE MISURE QUANTITATIVE IN MEDICINA [IT/IT]; Via Ludovico di Breme, 79, I-20156 Milano (IT).

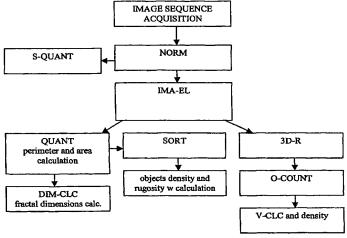
(72) Inventors; and

(75) Inventors/Applicants (for US only): DIOGUARDI, Nicola [IT/IT]; Instituto Clinico Humanitas, Via Manzoni, 56, I-20089 Rozzano, Milano (IT). GRIZZI, Fabio [IT/IT]; c/o Instituto Clinico Humanitas, Via Manzoni, 56, I-20089 Rozzano, Milan (IT). RUSSO, Carlo [IT/IT]; c/o Istituto Clinico Humanitas, Via Manzoni, 56, I-20089 Rozzano, Milan (IT). FRANCESCHINI, Barbara [IT/IT]; c/o Instituto Clinico Humanitas, Via Manzoni 56, I-20089 Rozzano, Milano (IT). VINCIGUERRA, Paolo [IT/IT]; c/o Istituto Clinico Humanitas, Via Manzoni, 56, I-20089 Rozzano (IT). TORRES-MUNOZ, Ingrid [IT/IT]; c/o Istituto Clinico Humanitas, Via Manzoni, 56, I-20089 Rozzano (IT).

- (74) Agents: LONG, Giorgio et al.; Jacobacci & Partners S.p.A., Via Senato, 8, I-20121 Milano (IT).
- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),

[Continued on next page]

### (54) Title: METHOD AND APPARATUS FOR ANALYZING BIOLOGICAL TISSUES



(57) Abstract: The present invention relates to a method and an apparatus for processing images of irregularly shaped objects, such as biological specimens, in particular of human or animal origin, or images thereof. The metric quantification of a biological body part or tissue or of a material spot or aggregate of any origin, which is contained therein, is also performed by means of the invention method. In particular, the method of the present invention is applied to the "conical microscopy" technique. In particular, the present invention relates to a method of processing digital images comprising one or more objects to be quantified, the said method comprising the following main stages: - normalization of the digital images; - quantization of the images to one bit, further comprising at least one of the following stages: - calculating, from the said images quantized to one bit, the perimeter, area and/or fractal dimension of the said one or more objects to be quantified; - reconstructing, from the said images quantized to one bit, a 3D-image of the said one or more objects to be quantified, and/or-calculating, from the said normalized images, the fractal dimension of the overall image.



## WO 2005/006255 A1



European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

#### Published:

with international search report